

**DIAGNOSTIC PROCEDURES USING  $^{129}\text{Xe}$  SPECTROSCOPY  
CHARACTERISTIC CHEMICAL SHIFT  
TO DETECT PATHOLOGY *IN VIVO***

Abstract of the Disclosure

An *in vivo* non-invasive method for detecting and/or diagnosing a pathological condition using hyperpolarized  $^{129}\text{Xe}$  spectroscopy is disclosed. Generally stated, the method includes determining the magnitude of spectral peaks which represent  
5 particular chemical shifts and comparing the observed magnitudes to those of healthy individuals. Preferably, the method includes subtracting substantial backgrounds and accounting for secondary conditions such as the polarization of hyperpolarized gas administered. Additionally, a quantitative analysis of hyperpolarized  $^{129}\text{Xe}$  spectra advantageously allows a physician to establish the extent of disease progression.  
10 Advantageously, this method can be used regardless of the method of hyperpolarized  $^{129}\text{Xe}$  administration.